

Director of the U.S. Patent
and Trademark Office
Washington, D.C. 20231
USA

Zürich, 2010-10-08

Dear Sir,

This letter refers to the application no. 10/578'508 of Daniel Kopf et al., filed Sept. 26, 2006.
(Further information: Group Art Unit: 2828, Examiner: Y. Zhang, Docket No.: 117891).

I, Dr. Rüdiger Paschotta, a citizen of Germany, hereby declare and state:

1. I received a degree in physics from the University of Konstanz in Germany in 1991.
Following research work on frequency doubling and the generation of nonclassical light, I received my Ph.D. with highest distinction (summa cum laude) in September 1994.
2. Thereafter until mid 2005, I worked in various university research groups, performing research in various subject areas, all within the area of photonics and laser technology. In particular, I have been leading a research group at ETH Zurich (11/1997 to 06/2005) developing mode-locked lasers of various types, including both bulk and fiber lasers, also related topics such dispersion compensation, pulse compression, numerical modeling of pulse propagation, and the like. In 2002, I have achieved the habilitation (i.e., a higher academic degree than a Ph. D.) in Applied Physics.
3. Since June 2004, I have been involved in independent technical consulting for the company RP Photonics Consulting GmbH in Zurich, Switzerland, which I founded in 2004. My work covers a wider technical area, but regularly touches the area of laser pulse generation. I continue to observe the scientific literature in such topical areas and to regularly attend scientific conferences.

4. I have reviewed and I am familiar with the subject matter disclosed in, and specifically as recited in the claims of, Applicants' above-identified U.S. Patent Application No. 10/578,508 ("the application").
5. I have also carefully reviewed U.S. Patent No. 5,212,698 to Kafka et al., the published article, "Ti:sapphire regenerative amplifier for ultrashort high-power multikilohertz pulses without an external stretcher" by Joo et al. ("the Joo article"), and the June 9, 2010 Office Action concerning the application. In addition, I had a brief look at various other documents related to the current matter.
6. Based on points 1 to 5, I can confirm that I am an expert in the relevant technical area, have at least ordinary skill in all of the relevant detail matters (such as pulse generation, mode-locked lasers, regenerative amplifiers, and chromatic dispersion), and have a decent knowledge of the documents related to the application.
7. When studying the June 9, 2010 Office Action, I came to the conclusion that the rejection of the application is largely based on the claim of prior art, substantiated to a large degree with the US patent 5'212'698 of Kafka et al. It is stated that many essential features of the application have either been explicitly disclosed by Kafka et al. or would result from Kafka's claims by variations which would appear obvious to one having ordinary skill in the art.
8. Based on my experience and a review of the above materials, I respectfully disagree with the Examiner's allegations, in particular concerning prior art as described by the patent of Kafka et al., which appears to be the central argument for rejecting the application.
9. It is essential to consider the difference between two types of devices: (a) mode-locked lasers and (b) regenerative amplifiers. A mode-locked laser is used for generating pulses, whereas a regenerative amplifier is used for amplifying pulses generated with a separate device (usually a mode-locked laser). Whereas a pulse circulating in a mode-locked laser will usually have essentially unchanged parameters (energy, duration, bandwidth, etc.) after each resonator round trip, and will continuously circulate in the resonator over the whole time of operation, a pulse does only a limited number of round trips in a regenerative amplifier, and its pulse parameters (in particular, the pulse energy and peak power) will undergo substantial changes in each round trip and change dramatically within the order of 100 round trips. As a result of these differences, which are well known to persons with ordinary skill in the art, there are essential differences not only concerning

the principle of operation, but also concerning the role of various physical effects such as optical nonlinearities and chromatic dispersion, the risk of optical damage, the evolution of the pulse duration, and the factors limiting the performance figures. As a result, designing either a mode-locked laser or a regenerative amplifier are essentially different tasks involving different technical challenges. Only to a very limited extent, one can transfer insights from one type of device to the other one.

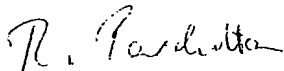
10. In particular, the role of dispersive elements contained either in a mode-locked laser or in a regenerative amplifier is essentially different. In a mode-locked laser, dispersive elements are usually used for compensating dispersive effects of other elements, and partially compensating effects of optical nonlinearities. In a regenerative amplifier, in particular of the type as is relevant for the application, chromatic dispersion can be exploited for strong temporal pulse stretching. Whereas such pulse stretching would usually be undesirable in a mode-locked laser, it can be essential for reaching high pulse energies with a regenerative amplifier.
11. Whereas the Kafka patent appears to be fully devoted to mode-locked lasers (and does not even mention regenerative amplifiers), the current application concerns regenerative amplifiers only. I am confident that any person skilled in the art would confirm that. Please note: The fact that claim 1 of the application mentions a “laser system” does *not* mean that the considered systems are lasers rather than amplifiers; it is only that the “laser” principle – light amplification by stimulated emission of radiation – is used in both types of devices. Both the application and the Kafka patent are very clear in referring to only one of the two types of devices.
12. Although both the Kafka patent and the current application discuss the use of dispersive elements within the resonator, their roles are essentially different. As explained above (10), Kafka considers dispersion compensation and not pulse stretching, while the current application concerns pulse stretching only. This holds irrespective of the fact that the types of dispersive elements used for either purpose can be similar. As the invention relates to the *use* of dispersive elements rather than to *new types* of dispersive elements, that similarity is irrelevant in my view.
13. When the June 9, 2010 Office Action repeatedly claims that the Kafka patent describes the use of a pulse stretcher or details of a regenerative amplifier, this is not true. An additional misunderstanding, which may be of lower importance, is that the “block of

highly dispersive material" (see 7 in Fig. 2 of the Application) has been confused with the use of prism pairs made of such materials; the essential difference is that prisms utilize geometric contributions to the chromatic dispersion (and therefore require more space), whereas the mentioned block simply introduces material dispersion and can be rather compact.

14. For these reasons, my opinion based on my detailed knowledge is clearly that the arguments presented in the Office Action fail completely in demonstrating prior art based on the Kafka patent. In other words, the Kafka patent is misapplied and can not serve to reject the current application. Consequently, similar allegations based on Kafka's claims combined with obvious modifications cannot serve this purpose.

15. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing there from.

With best regards



Dr. Rüdiger Paschotta

RP Photonics Consulting GmbH